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IMPROVEMENT OF THE DEPARTMENT OF TECHNICAL SCIENCES,
ACADEMY OF SCIENCES USSR

A number of substantial shortcomings in the activity of scientific-research institutions of the Department of Technical Sciences of the Academy of Sciences USSR was revealed by an editorial in Pravda of 17 September 1951. In connection with this editorial, the Presidium of the Academy of Sciences USSR, in a decision accepted at the session of 28 September 1951, outlined concrete measures for improvement.

During the year since the decision was accepted, the efforts of the Department of Technical Sciences were directed toward the revision and reconstruction of the thematic plans and structure of institutes, sections, and laboratories and to selection and distribution of personnel, with the purpose of bringing the entire activity of the department institutions closer to the requirements of the national economy.

One of the essential criteria of progress in the reconstruction of the Department of Technical Sciences is the development of the scientific-research works to give scientific assistance to construction projects, such as erection of the largest hydroelectric power stations, canals, and irrigation systems, in conformity with the Stalin Plan for the Transformation of Nature.

To promote a direct connection of the scientific institutions with the great structures of Communism, the Presidium of the Academy of Sciences USSR organized permanent active brigades, with prominent specialists participating for reasons of scientific assistance to "Kuybyshevgidrostroy," "Seilingradgidrostroy," and construction works of the Main Turkmen Canal. One of these groups of scientists gave substantial help to the builders of the Volga-Don Canal, with scientific consultations on the problems of hydromechanization, concrete placing, electric welding, machinery utilization, etc.

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Numerous construction problems of the Main Turkmen Canal were discussed at scientific-technical sessions of the permanent complex brigade especially organized for assistance to construction works on the canal. These sessions took place in April and May 1952 at Takhia-Tash and Ashkhabad and attracted the representatives of the scientific institutions of the Department of Technical Sciences and other academy departments; the Academies of Sciences of the Uzbek, Turkmen, Kazakh, Tadzhik, and Georgian SSRs; Academy of Architecture USSR; "Sredazgidrostroy;" ministries; higher educational institutions; and specialized scientific-research institutes.

On the basis of wide discussion of various problems, the complex brigade made numerous suggestions to the designers and builders of the Main Turkmen Canal in the field of hydraulic engineering, road construction, materials, mechanization of works, production of concrete and reinforced concrete, residential construction, the acceleration of construction, and increasing the economical effectiveness of canal structures.

In 1951, the Department of Technical Sciences was working on 54 projects related to the great structures of Communism, but following the instructions of Pravda and the Presidium, increased the volume of such works in 1952. Scientific establishments of the department conducted works on the subjects of power balance; conditions for unification of the power systems of Kuybyshev, Moscow, and Stalingrad; effective distribution and long-range transmission of the power of the new hydroelectric stations; utilization of electric power in agriculture; further development of electric machine-tractor stations; and development of local power systems, especially in the areas of the great structures of Communism. A number of new calculating methods were worked out for more rapid, dependable, and economical designing of hydraulic structures; methods were suggested for compacting hydraulic-fill dams; new equipment was designed for making various measurements in the process of testing models of hydraulic turbines; and new electric welding equipment was developed.

Despite all the achievements mentioned here, it still can not be said that all scientific establishments of the Department of Technical Sciences took measures for a maximum increase in the volume of scientific-research works which would serve to benefit the great structures of Communism.

Thus, the Institute of Automatics and Telemechanics is not yet conducting works on automatization and telemechanization of large power systems on the proper scale and, consequently, does not properly fulfill the basic requirements urgently presented to the institute in connection with the development of the Soviet electric power industry.

The Institute of Machine Studies has delayed greatly the investigations of forces, stresses, and vibrations in components of hydraulic turbines with adjustable blades. The first results of these works have already helped the Leningrad Metalworking Plant imeni I. V. Stalin in designing the unique hydraulic turbines of the largest hydroelectric power stations; however, the rate of investigations is still behind actual requirements.

The Section on the Scientific Development of Water-Economy Problems is not in a position to deal successfully with those important complex problems posed presently before the Academy of Sciences USSR in the field of water economy, hydrology, and hydraulic engineering. The section needs serious reinforcement of its scientific personnel and experimental base. The laboratory of stream-bed processes, assigned to the section, did not properly revise its activity and still shows no results beneficial to large hydraulic-engineering projects.

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The Metallurgical Institute and certain other institutions of the Department of Technical Sciences are not utilizing all their possibilities in fulfilling the requirements of the great structures of Communism

The bureau of the department is not yet realizing sufficiently effective and systematic control over the development of new works. Shortcomings in the field of scientific assistance to construction works are partially due to inadequate guidance by the Committee for Assistance to the Construction of Hydroelectric Power Stations, Canals, and Irrigation Systems. This committee, organized by the Presidium of the Academy of Sciences, sometimes obliged the scientific establishments of the department to perform works beyond their scope and real possibilities or assigned them to tasks which could be successfully fulfilled by specialized scientific-research institutes and planning organizations. Examples of some of these tasks are the problems of flood forecasts, mechanization of operations for unloading cement from railroad cars, etc.

The above-mentioned practice of scientific assistance to construction, in the case of the Main Turkmen Canal, is an example of proper coordination of scientific investigations into the major problems of construction works and of clear definition of the role and place of various scientific institutions in the project. Thus, the Institute of mechanics received the following assignments: development of the theory of ground-water movement toward horizontal drains and wells of mechanical drainage, with the simultaneous functioning of irrigation systems, under conditions of the lower part of the Amu-Dari'ya River and experimental study of water filtration out of a canal. The Section on the Scientific Development of Water-Economy Problems has to deal with the following problems: studying the stable forms of canals, typification of canals and investigations into the methods for reinforcement of slopes, development of methods for modeling stream beds under erosion conditions and the motion of suspended alluvia, and studying the behavior of ground water in the zone of canal influence and developing methods for regulating this water.

Essential problems are posed by Soviet industry in the building of hydraulic turbines and generators. Discussion of these problems at the general meeting of the Department of Technical Sciences revealed that the construction of unique turbines for the great structures of Communism puts forward the problem of securing the strength and dependability of a hydraulic turbine and its rotor at a high value of the efficiency factor and in the absence of cavitation. A number of new requirements are applied to the regulation system of hydraulic turbines, since the stability of regulation in connection with possible variations in an electric power system is considered as an extremely important factor. Fabrication of a large number of hydraulic turbines in short periods requires the development of new progressive technology, high-production processes on specialized machine tools, high-speed cutting methods, improved methods for casting turbine blades out of stainless steel, etc.

Hydraulic generators now being designed for new power stations on the Volga River are supposed to surpass by far the most powerful generators of Western Europe and the US with their geometrical dimensions, weights, and thrust-pin pressure. In conformity with the Fifth Five-Year Plan, the total power of electric stations has to be increased twice and that of hydroelectric stations, three times. The plan provides for completion of large hydroelectric stations, including the Kuybyshev station, with a capacity of 2,100,000 kw, and also stations on the Kama River and at Gor'kiy, Mingechaur, Ust'-Kamenogorsk, and others, with a total capacity of 1,910,000 kw. The Kuybyshev-Moscow transmission line must be completed also.

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Theoretical generalization and further development of practical achievements of production workers must be one of the essential functions of the Department of Technical Sciences. Activity on the generalization of scientific-technical achievements of advanced enterprises and production innovators in the field of metal cutting may be presented as an example of such functions. The initiative in this field belongs to the Commission on the Technology of Machine Building at the Institute of Machine Studies of the Academy of Sciences USSR. The commission, headed by V. I. Dikushin, Corresponding Member of the Academy of Sciences USSR, in June of 1952, arranged a conference on the norms of metal cutting, jointly with the Ministries of Machine-Tool Building USSR and Higher Education USSR. This conference was called to generalize widely the experience of production workers and scientific-research institutions of industry in the field of metal cutting, to create coordinated plans of scientific investigations, and to pose new problems before the machine-building industry. In addition, the conference promoted personal contacts among scientists and production innovators. The initiative of the Commission on the Technology of Machine Building in the field of scientific generalization of industrial achievements and in the development of fundamental trends of new technique was approved by the Presidium of the Academy of Sciences USSR and must be widely used in the activity of other scientific institutions.

An essential role in establishing a close association of scientists with production innovators belongs to the so-called agreements on creative cooperation. On the basis of these agreements, some scientific establishments showed good progress in the development of separate scientific problems and in practical realization of results obtained in investigations. The following are several examples of cooperation between science and production.

For a number of years, the Institute of Mineral Fuels of the Academy of Sciences USSR has carried out an agreement involving cooperation of scientists of the institute with the collective of an experimental plant of the Ministry of the Coal Industry. This close cooperation helped to improve a new method for coal dressing developed at the institute. The method has essential significance in the national economy. On the basis of this method, a coal-dressing plant was built, and further development of dressing processes is being continued. In addition, the institute assists the plant in improving the qualifications of its engineering personnel.

The same institute also realized successfully the agreement with the Nizhniy Tagil Coking-Chemical Plant and the Novyy Tagil Metallurgical Plant. The agreement is aimed at intensifying the operation of blast furnaces on the basis of the methods developed at the institute and further expansion of raw-material resources for coking. Experimental coking under industrial conditions, using new methods, gave good results, and the entire project has been highly evaluated by the industry.

The agreement on cooperation between the Petroleum Institute of the Academy of Sciences USSR and petroleum producers of Bashkiria stimulates the efforts of the organizations covered by the agreement toward the goal of the entire petroleum industry, i.e., an annual production of 60 million tons. Obligations under this agreement include the development and quick practical application of new, efficient methods of oil processing, intensification of the processes of oil-well drilling and exploitation, and also new designs of plant and laboratory equipment.

The Institute of Machine Studies, in cooperation with the Yaroslavl' Automobile Plant, developed a new two-cycle gas engine for heavy trucks and buses. Test of experimental engines on stands, and in a 7-ton truck and a bus, showed that the new engine excels all existing automobile gas engines by its efficiency and specific capacity. The new engine permits the use of

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substitute, local, combustible gases for liquid-oil fuel and improves the basic operational qualities of Soviet heavy trucks. Such qualities of the new engine as smokeless and more quiet running are especially essential for city buses.

Generally, the creative cooperation of scientists with production workers becomes an increasingly important factor in the progress of Soviet industry. However, in addition to the considerable achievements, there are serious deficiencies in activity of this kind. Thus, despite substantial progress in separate cases of cooperation with industry, on the whole, the activity of the Institute of Machine Studies in this respect is not quite satisfactory. A large number of agreements, about 40, between the institute and industrial enterprises create only the appearance of satisfactory conditions and progress. In reality, the obligations of participants in many agreements are not properly outlined, the dates for fulfillment of these obligations are not always fixed, there is no systematic checking on fulfillment of agreements, and the personnel responsible for agreements is not always appointed. Agreements of the Institute of Machine Studies on cooperation with industry in many cases are merely formal documents and can not give any scientific or technical results. The agreement of the Section on Water Economy with "Kuybyshevgidrostroy" and with the Planning Office of the Administration of Hydromechanization has neither dates nor a working schedule. Numerous agreements of the scientific establishments of the Department of Technical Sciences were never discussed or reviewed by the scientific councils of these establishments. All these shortcomings decrease the effectiveness and political significance of agreements on cooperation with industries. This situation attracted the attention of the Moscow city party organization, which, after discussing the problem, suggested a number of corrective measures.

The following brief summary on the activity of the individual institutes and sections may demonstrate the changes in structure and activity of the Department of Technical Sciences effected by the decision of the Presidium of the Academy of Sciences at the session of 28 September 1951.

Institute of Machine Studies

Some development was shown by new trends in scientific-research works on the technology of machine building and the automatization of technological processes in machine building. Works on the development of new methods of machine design were advanced, including additional subjects connected with scientific assistance to the great structures of Communism.

But the institute still did not eliminate all the shortcomings in its activity. It did not promote the theory on the design of the most essential machinery. Almost nothing was done in the field of rational use of materials in machine building and development of specifications for new materials. Works on the automatization of production processes in machine building also are developed unsatisfactorily.

Mining Institute

Efforts of the institute to develop efficient mining practice and mineral-dressing methods cover all problems of the Soviet mining industry. However, despite the actuality of investigations conducted at the institute, their tempo is inadequate. There is a delay in obtaining final results and in their introduction to industry. In 1952, the institute contributed only one project to the mining industry. The institute pays little attention to the engineering-economic problems of mining. Separate laboratories and groups have 3 to 4 scientific workers each and therefore can not efficiently deal with complex scientific problems. The institute is insufficiently connected with the

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academic and specialized scientific-research establishments and has not yet assumed a leading position in the coordination of scientific investigations on the problem of mining.

Institute of Mechanics

Criticism stimulated improvement in the activity of the institute. It has increased its scientific assistance to the great structures of Communism. Methods developed at the institute for design of hydraulic structures are beginning to become practical realities.

Experimental and theoretical investigations were conducted on the theory of plasticity for the case of complex loading. Methods were developed for calculation of the unstable filtration of ground water. No significant results were achieved in expansion of the experimental side of the activity. The institute was not sufficiently persistent in works on equipping a number of laboratory installations and in the organization of new laboratories.

Power Engineering Institute

Eliminating insignificant subjects, the Power Engineering Institute noticeably increased the volume of work related to the solution of scientific problems most important for the great structures of Communism. However, the complex problems of power engineering still are not in a central spot in the activity of the institute. As before, there is no proper coordination in the activity of adjacent laboratories. This important shortcoming, noted by the Presidium in its decision on 28 September 1951, has not yet been eliminated by the management and personnel. The institute is not utilizing all possibilities for effective assistance to the development of electric power applications by practical realization of the results of completed scientific works.

Institute of Automatics and Telemechanics

Progress in reorganization of the activity of the Institute of Automatics and Telemechanics is not quite satisfactory. Scientific assistance to construction of the largest electric power stations and power systems is minor as yet. The contribution of the institute to the automatic control of electric power and other fields of the national economy is insignificant.

Section on Scientific Development of the Problems of Transport

Because of poor supervision, the Section on Scientific Development of the Problems of Transport scattered its efforts on the solution of separate problems, sometimes of secondary significance. Important projects have not been completed. Theoretical calculations on the essential problems of increasing the effectiveness of transport operations were not properly verified experimentally and did not get practical application. The selection of personnel is one-sided, without consideration of the main task of the section -- work on the complex scientific problems of all types of transport. Scientific workers of the section are mostly specialists in the field of railroad transport.

In conclusion, it may be said that the Department of Technical Sciences attained some progress in closer cooperation of scientific institutes with industry and in the development of investigations into the scientific problems of the great structures of Communism. However, it should be admitted that the bureau of the department and the supervisors of scientific institutions have not provided yet for an adequate reorganization of the activity.

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of the department in a number of the most essential fields. The major problems before the department still require numerous efforts of the entire group of Academicians, Corresponding Members of the Academy of Sciences USSR, and scientists working in department establishments.

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